

LTAP Purdue Road School 2017

Introduction to Portable Traffic Signals

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Topics We Will Cover

- Benefits of Portable Traffic Signals
- PTS vs Pole-Mounted signals
- Types of PTS
- Specs
- Specialty Systems and Components

Portable Traffic Signals

- The next step in work zone safety technology
- Removes flaggers from the dangers of traffic control
- Automatic, 24-hour operation
- Several different types available for a variety of applications
- Gives engineers a more efficient and cost-effective solution for traffic control in work zones



Benefits of Using PTS

- Eliminates need for human traffic control
- Traffic signals are familiar and universally recognized
- Add-on components adapt to unique situations
- Reduces long term costs over use of flaggers



Why Use PTS?

- SAFETY
- Improve drivers' ability to react to unfamiliar work zone
- Safely manage multiple phases of traffic including side roads, driveways, intersections, etc



PTS v Pole-Mounted Signals

PTS v Poles

- Poles
 - Require access to power grid
 - Often delays start time of projects for installation and activation
 - Limited by geography of site; trees, underground utilities, etc
 - Costs can easily exceed \$100k in just 2 years (Source: TDOT.com)



PTS v Poles

- Portable Signals
 - Run on independent power bank, and solar
 - Underground utilities are not a concern
 - Can be rented or purchased
 - Cost savings grow exponentially each year of ownership
 - Convenient for multi-stage projects in which signals must be moved



Safety, Safety, Safety

- Recent studies (Minnesota DOT) have concluded that PTS are a safer means of traffic control than flaggers
- Malfunction Management System monitors for signal faults
- Controlling traffic is dangerous!
- If a signal gets hit by a vehicle, nobody dies

Traffic Signals are replaceable...



...humans are not!

IMUTCD

Section 4D.32 – allows for the use of Portable Signals on roads and drives within a one-lane, two-way work zone

Phasing / Timing Plans per IMUTCD

- Shall be in accordance with FHWA Signal Timing Manual
- Cycle lengths limited to 255 seconds
- Red intervals limited to 99 seconds
- Minimum Green interval = 15 seconds for major arterials, 10 seconds for minors

Malfunction Management System per IMUTCD

- Real-time monitoring of signal functionality to ensure safe operation
- Any potentially unsafe scenario causes a signal fault (Flash)
- Conflicting indications, lamp loss, communication loss, low voltage

Different PTS Platforms



Trailer-Mounted
(2 signal heads)
Long-term
INDOT Approved



Trailer-Mounted
(1 signal head)
Short to Medium Term



Pedestal-Mounted
Short-term

Trailer-Mounted PTSs

- Designed for medium to long term applications
- High wind-load capacities
- Extendable overhead mast arm
- Bright 12" LED indications
- On-board battery bank
- Large array of solar collection
- 2 signal heads per approach, per IMUTCD



The Portable Traffic Signals may be fully set-up within 20 minutes and communicate wirelessly.

- INDOT Office of Materials Management: Procedure for Evaluation and Approval List Requirements for Portable Traffic Signals

Trailer-Mounted PTSs

- Wireless radio communication
- Fast & easy deployment
- Full conflict monitoring between all signals
- Weeks of operating time on batteries alone



Applications

- Medium to long-term projects
- Lane closures
- Bridge repair
- Knockdowns
- Haul Roads
- Full intersection control
- Roundabouts
- etc



“The deployment of Portable Signal Systems results in safer and more efficient operations.”

-MNDOT Efficiencies Efforts Report, 2014









LEFT TURN
YIELD
ON GREEN



STOP
HERE ON
RED





AMBULANCE ONLY

CHICAGO FIRE DEPARTMENT
EMERGENCY MEDICAL SERVICES
72





SHOULDER
CLOSED

10





Pedestal Mounted PTSs

- Perfect for short-term/daily operations
- Easy deployment
- 4 carts per system
- On-board battery bank
- 3-5 days run time





CAUTION
CONSTRUCTION
ZONE
DO NOT ENTER

CONSTRUCTION
ZONE
NO SMOKING



STOP
HERE
ON
RED

Trailer-Mounted PTS with Single Head

- Short to medium duration projects
- Easy deployment
- On-board battery bank
- 15-20 days run time



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NEMATS-5

NEMA TS-5

- Previously existing NEMA standards (TS-1 / TS-2) are written around permanent installations
- NEMA PTS technical committee was formed in 2010 to develop an appropriate standard for PTS systems.
- Will be published & released this year

Specialty Systems & Components

"The portable signal shall be equipped with remote monitoring. Unless otherwise shown on the plans, wireless vehicle detection shall be provided. Drums shall be placed immediately in front of the portable signal trailer at both corners for delineation."

--INDOT: 801-T-211 Portable Traffic Signals (Adopted 12-17-15)

"... (the PTS) can be programmed for at least 6 phases and is compatible with standard loop and wireless vehicle detection, pedestrian signals, emergency vehicle and railroad preemption."

- INDOT Office of Materials Management: Procedure for Evaluation and Approval List Requirements for Portable Traffic Signals

Actuation

- Doppler Sensor detects vehicles moving toward signals
- Can activate or extend green times based on traffic demands
- Gives user flexibility by programming minimum/maximum green intervals



Actuation

- Video detection system allows for true presence detection
- Create custom detection zones
- Differentiate between individual lanes of traffic (ex: left turn)
- Loops and Pucks also compatible with PTS



Pre-Emption



- Detects optical strobe light patterns from emergency vehicles
- Provides earliest safe green indication
- Provides emergency vehicles safe passage through work zone

Railroad Pre-Emption

- Reverts signals to all Red when train intersects work zone
- Direct connection to gate/signal controls
- Hardwired or Wireless connection





Pedestrian Signals

- Work in conjunction with standard PTSs, or as stand-alone devices
- Countdown shows time remaining to cross
- Pushbutton actuation
- ADA compliant ped signals compatible





Pedestrian signals can be integrated directly with trailer-mounted PTS



OCEAN AVE

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Wireless Knockdown



- Wireless connection to existing permanent intersections
- Real-time conflict monitoring
- Restore disabled intersections to working order within minutes





ONE WAY

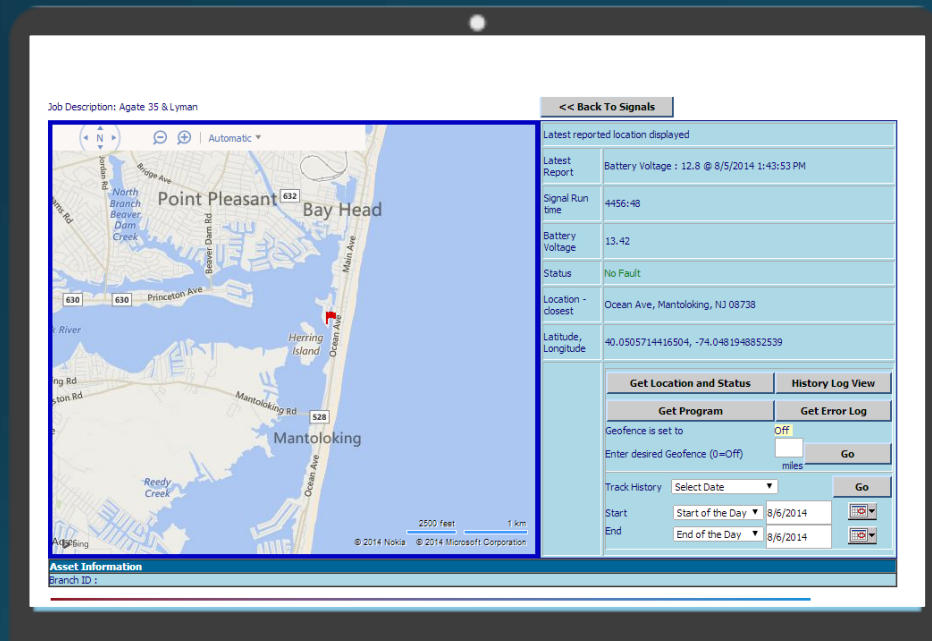
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Remote Monitoring

- Required as per INDOT 801-T-211 “Portable Traffic Signals” (Section 801)
- Monitors signal operation and status
- Reports alerts via text message and email
- Daily battery reports keep the user informed of voltage levels

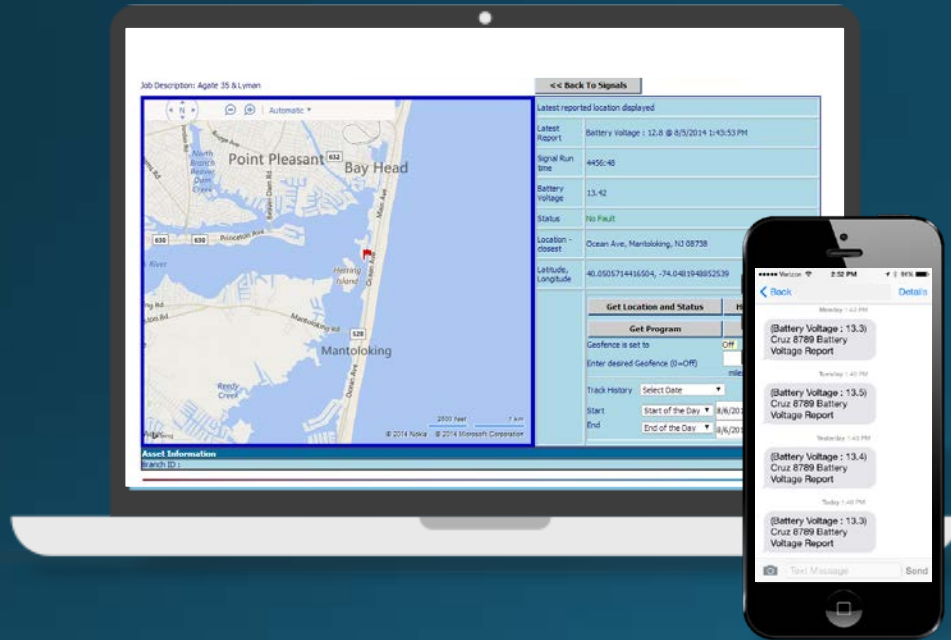


Remote Monitoring



- Dedicated website provides detailed logs and signal history

Remote Monitoring



- Up to (3) individuals can be contacted for each alert
- Monitors lamp loss, conflicting indications, communication loss, and battery voltage
- Can also monitor signal location via geofence

Message Board Interface

- Real-time messages about signal status
- Wireless connection
- Custom messages like “Red Light Ahead” when signal changes
- Ideal for blind curves where sight distances are poor



Wait Time and Fault Display

- Provides visual countdown until next green indication
- Alerts motorists in the event of signal failure
- Improves fault modes (instead of just flash red on both sides)



Wait Time and Fault Display

- Long work zones:
“Up to (x) minutes
Wait”
- Small size (shown
here) and large size





Dedicated Left Turn

- Protected left turn movement
- Allows for advanced intersection deployments
- Typically used in conjunction with some form of presence detection



Driveway Assistance Device

- Safe traffic control for residential driveways within a work zone
- Flashing arrows indicate the direction traffic is currently flowing
- Allows driveway traffic to merge with queue without the need to stop primary phases in favor of dedicated driveway phase





NO
TURN
ON RED
●

YIELD IN
DIRECTION OF
FLASHING
RED ARROW
AFTER STOP



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